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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/529,574

01/16/2007

Hans-Jurgen Dobschal

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EXAMINER

CHANG, AUDREY Y

ART UNIT

PAPER NUMBER

2872

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,574	DOBSCHAL ET AL.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 January 2007 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/16/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's preliminary amendment filed on January 16, 2007, which has been entered into the file.
- By this amendment, the applicant has amended canceled claims 1-24 and has newly added claims 25-53.

Claim Objections

1. Claims 25-53 are objected to because of the following informalities:

(1). The phrase "inspection radiation" and the phrase "observation radiation" recited in claims 25 and 53 is confusing since it is not clear what is considered to be "inspection" and what is considered to be "observation"? Does this mean "inspection" does not need "observation"? The two radiations are therefore being examined as arbitrary radiations.

(2). The phrase "said main optics being corrected" recited in claim 25 and the phrase "corrected for predetermined observation radiation" recited in claim 53 are confusing since it is not clear what is being corrected?

(3). The phrase "a grating has symmetry" recited in claim 31 is vague since it is not clear what is the symmetry about or what is being symmetric?

(4). The phrase "optical effective surface" recited in claim 37 is confusing since it is not clear what is considered to be "optically effective"? Any interface between elements that have different refractive index will affect the light optically.

(5). The phrase "optimizing the transmissive diffractive element:" recited in claim 53 is confusing since it is not clear what is being "optimized" here.

Appropriate correction is required.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “grating having symmetry”, (claim 31), “annular depression which are concentric” (claim 33), “depth of the depression decreases as the radial distance ... increases” (claim 35), “diffractive element ... positioned only in an annular region” (claims 38 and 39), “blazed grating” (claim 40), and “a blaze profile approximated in steps” (claim 41), must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Art Unit: 2872

4. Claims 25-27, 36, 40-41 and 50-51 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Kashima (PN. 5,631,779).

Kashima teaches a lens system serves as the imaging optics that is comprised of main optics with a plurality of optical elements and a transmissive diffractive element (r12, Figure 1) for correcting aberration of the main optics by the diffractive effect of the diffractive element, (please see column 4, lines 8-10). Kashima teaches that the chromatic aberration can be corrected for radiation with wavelength from ultraviolet to visible or just the visible, (please see column 18, lines 22-44). This means if the inspective radiation is in visible wavelength range and the observation radiation is in the ultraviolet range, then the lens system can correct chromatic aberration for inspection radiation in visible range having wavelength different from the observation radiation (i.e. ultraviolet range).

With regard to claim 26, it is implicitly true that the diffractive element does not substantially change the imaging properties of the main optics for the observation radiation.

With regard to claim 27, it is implicitly true that it is the non-zero order diffracted light that corrects the aberrations.

With regard to claim 36, Kashima teaches that the diffractive element is positioned on one side of plane-parallel plate.

With regard to claims 40 and 41, Kashima teaches that the diffractive element is blazed grating (please see Figure 30) and may have steps approximate the blazed profile, (please see Figure 31).

With regard to claims 50-51, Kashima teaches that the lens system can be made with the same material (please see Embodiment 6) or with maximum two materials (please see Embodiment 5).

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2872

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 28-29, 38 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashima.

The lens system taught by Kashima as described for claim 25 above has met all the limitations of the claims.

With regard to claims 28 and 29, this reference does not teach explicitly that the diffraction efficiency for the zero order of diffraction for the observation radiation is 80% and is greater than the sum of all other orders. However, it is known in the art to design the diffractive element to have desired diffraction efficiency for different diffraction orders, (i.e. this is done with respect to basic diffraction theory). It would then have been obvious to one skilled in the art to design the diffractive element with a diffraction efficiency for the zero order diffraction light to be 80% and greater than the sum of all other orders so that the diffractive element can produce mainly zero order diffraction light as desired.

With regard to claim 38, it is an obvious modification to one skilled in the art to make the diffractive element positioned in the annular region for the benefit of making the lens system utilizes mainly the central annular portion of the radiation beam.

With regard to claim 42, it would have been obvious to one skilled in the art to arrange the diffractive element at the region that the observation radiation has the greatest beam diameter for optimal operation.

7. Claims 31-35 and 52-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashima in view of the patent issued to Omura (PN.6,903,803).

The lens system taught by Kashima as described for claim 25 above has met all the limitations of the claims.

Art Unit: 2872

With regard to claims 30-33, Kashima does not teach explicitly that the diffractive element is a phase grating with symmetry and has concentric annular depression. Omura in the same field of endeavor teaches a projection lens system wherein diffractive element is used for correcting aberration of the lens system. The diffractive element has annular depressions that form concentric rings and the rings or the annular depressions have a rotational symmetry with respect to the normal axis passes through the center of the diffractive element. It would then have been obvious to one skilled in the art to apply the teachings of Omura to modify the diffractive element to have the depressions be formed with concentric arrangement and has rotational symmetry for the benefit for the diffractive element to symmetrically diffract the light incident upon it.

With regard to claims 34 and 35, Kashima teaches that the depressions have same depth but it does not teach it may also have decreasing depth as radius from the center increases. However this feature is considered to be obvious matters of design choice to one skilled in the art. Since as the claims suggest the depth does not effect the aberration correction function of the diffractive element.

With regard to claim 52, Kashima does not teach explicitly that the lens elements are without cement. Omura teaches it is possible to make the lens system without cement. It would then have been obvious to one skilled in the art to make the lens system without cement to avoid possible noise introduces by the cement.

With regard to claim 53, as indicated by the Figure 11 of Omura the lens system is manufactured first with a design step. It is implicitly true that the lens elements and the diffractive optical element can be mathematically designed (i.e. using well known lens equation and the phase function of the diffractive element) so that the lens system achieve desired lens function. Omura teaches that the mathematical design data is used to actually manufacture the lens system.

Art Unit: 2872

8. Claims 37, 39 43-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Kashima in view of the patent issued to Ogawa et al (PN. 6,791,754).

The lens system taught by Kashima as described for claim 25 above has met all the limitations of the claims.

With regard to claims 37 and 48, Kashima teaches the lens system includes a diffractive element (such as r22 in Figure 1) may be formed at optically effective surface of the refractive lens element. Ogawa et al also teaches the diffractive element may be formed at optical effective surface of the refractive element, (please see Figures 4 and 5). With regard to claim 39, it would have been obvious to one skilled in the art to arrange the diffractive element at the annular region of the refractive element to provide optimal operation.

With regard to claims 43 and 45, Kashima teaches the lens system may include a second diffractive element (such as r22 in Figure 1 and r14 in Figure 16) but it does not teach explicitly that the second diffractive element has diffraction enhancing and achromatizing effect. Ogawa et al teaches that the diffractive element in combination with refractive element can produce achromatizing effect, (please see column 1, lines 15-16). It would then have been obvious to apply the teachings of Ogawa et al to modify the second diffractive element in combination with the refractive element to have achromatizing effect to reduce the color effect.

With regard to claim 44, these references do not teach explicitly that the diffraction efficiency for the zero order of diffraction for the observation radiation is greater than the sum of all other orders. However, it is known in the art to design the diffractive element to have desired diffraction efficiency for different diffraction orders, (i.e. this is done with respect to basic diffraction theory). It would then have been obvious to one skilled in the art to design the second diffractive element with diffraction efficiency for the zero order diffraction light to be greater than the sum of all other orders so that the diffractive element to produce mainly zero order diffraction light as desired.

Art Unit: 2872

With regard to claims 46, 47 and 49, Kashima teaches that the second diffractive element may also be formed at surface of plane-parallel plate, (please see Figure 16). Although this reference does not teach explicitly that the first and second diffractive element are placed at opposite sides of the same plane-parallel plate or refractive optical element, such modification is considered obvious to make the system with more compact design.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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